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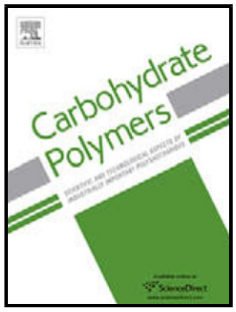

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PII: S0144-8617(15)00112-5
DOI: http://dx.doi.org/doi:10.1016/j.carbpol.2015.01.076
Reference: CARP 9669

To appear in:

Received date: 29-10-2014
Revised date: 22-1-2015
Accepted date: 30-1-2015

Please cite this article as: El-Wakil, N. A., Hassan, E. A., Abou-Zeid, R. E., and Dufresne, A.,Development of wheat gluten/nanocellulose/titanium dioxide nanocomposites for active food packaging, *Carbohydrate Polymers* (2015), http://dx.doi.org/10.1016/j.carbpol.2015.01.076

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Development of wheat gluten/nanocellulose/titanium dioxide nanocomposites for active food packaging

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ABSTRACT

Bionanocomposites were developed by casting /evaporation of wheat gluten (WG), cellulose nanocrystals (CNC), and TiO_2 nanoparticles. The effect of addition of different percentages of CNC, and TiO_2 on tensile strength (TS), Young's modulus and water sensitivity was studied. A significant improvement in the studied properties is observed when 7.5% CNC and 0.6% TiO_2 is added to WG. WG/CNC 7.5% /0.6% TiO_2 blend suspension was chosen to coat commercial packaging unbleached kraft paper sheets via 1, 2 and 3 coating layers. A significant enhancement of 56% and 53% in Breaking Length and Burst Index, respectively, was achieved for 3 layers coated paper. The antimicrobial activity of the coated papers, against *Saccharomyces cervisiae*, Gram- negative bacteria *Escherichia coli* and Gram- positive bacteria *Staphylococcus aureus,* was investigated and expressed in terms of reduction % of surviving number (CFU) of the tested organisms. More than 98.5% reduction in CFU was observed against the organisms compared to TiO_2 - free coated paper.

Keywords:

Bionanocomposites, cellulose nanocrystals, wheat gluten, TiO_2 nanoparticle, active food packaging

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